

**GGE6900 Research methods**

**Writing Skills Assignment**

**Part 2(Literature Review)**

**Professor Monica Wachowicz**

**Nasrin Eshraghi Ivari**

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IoT Infrastructure: Literature review

Nowadays, with the significant improvement in technology, the Internet of Things (IoT) has led to remarkable changes in the technology world. It has been gaining popularity in both research communities and industries. Interest in IoT has grown rapidly as the number of smart mobile devices and sensors has grown exponentially and the resulting datasets have found applications across many domains. IoT allows people and agents to interact with each other in the real world to create smart environments, such as smart transport systems, smart cities, smart health, and so on. The smart building integrates sensors, analyze data, and control systems to provide services that are essential to the occupants. The growing number of physical objects leads to the IoT challenge of sensors interacting with each other and sharing information through the internet infrastructure. The data which is collected from sensors plays a very important role in the IoT architecture.

One of the main challenges in buildings is energy efficiency. As people spend %90 of their life at their home, the Indoor Environmental Quality (IEQ) was introduced [1]. IEQ ensures heath and comfort of occupancy. It relies on sensor networks to monitor some measurements such as air, lighting and acoustics quality. With this platform, the cost will reduce.

There are two main steps in evaluating IoT platforms [2]. First, finding the optimum number of sensors and the most efficient architecture, protocols, network issues and configuration of all sensors[.](#_msocom_8) Second, the challenges from physical fundamentals to analytical capabilities.

Wireless Sensor Network or WSN is a group of dedicated sensors used for monitoring and measuring environmental conditions such as temperature, vibration, motion, sound, pollution levels, humidity, wind, and so on [3]. WSN systems consume less power, have independent network capabilities, and require low human interaction. The advantage of connecting IoT with wireless sensor networks is to be able to collaborate and provide some common services.

The capability to respond to all kinds of situations depends on the environment and observing the activities of the system. And then finding a pattern for these behaviors is the key. There are two main challenges to finding patterns [4]. First, feasible patterns that are established of separate events in the real world are interleaved by the existence of an actor performing multiple actions at a specific time or by showing multiple actions that act like multiple users. Second, the issues are the time interval between these patterns and time differences of single-action have a variation. As a result, recognizing patterns can be a challenge.

Analyzing and processing very large scale data is an issue in the field of IoT. After all the data is collected from the sensors the first few steps in data analysis are selection, preprocessing, and data transformation after gathering all the data [5]. To know which data is needed for the data analysis is the data selection part. All data collected from different sources required to be integrated. Cleaning, detecting, and filtering are done in the preprocessing section. The way to reduce complexity in the data scale is called transformation.

The next step is data analysis after the data has gone through quality checks and transformations. The most common method is data mining. One of the well-known problems in data mining is clustering which is a task of grouping a set of objects in the same cluster with the most similarity than the other groups. In the end, evaluation for measuring the result and interpretation play a very important role in terms of output. High-performance computing poses another significant challenge in data analysis. In [6] the authors have they mentioned that IoT and big data should develop together. To manage data and analysis of transmitted data, cloud computing plays a key role. Cloud computing is an infrastructure that has three services; software as a service, platform as a service and infrastructure as a service.

Last but not the least, security is a very challengeable part of IoT and WSN. There are some security algorithms to prevent attacks on the systems. One way is to secure sensor movement in the IoT infrastructure by an anonymous authentication scheme [7]. This approach works for problems related to the privacy of the sensor node that can be Denial of Service (DoS), replay attacks, anonymity, and untraceability. Heterogeneity is a very important topic over the security and protocols in the network [8]. On the other hand, the existence of heterogeneous objects affects identity management. Some techniques are needed to achieve authentication. Authentication shows the data flow parts generated by a specific entry, what the contents are. Also, this definition relates to authorization which gives an access level by an authorized user.

To conclude, IoT brings lots of technological challenges to our lives which is helps to make everything simpler, comfortable and beneficial. This area is so broadly such as medical, industrial, transportation, education and so on. As far as IoT platforms bring lots of advantages, it needs to solve sots of issues like architectures and security.

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